Japan Starting 10-Year Effort To Create Exotic Computer

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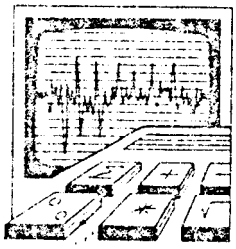
THE JAPANESE AREN'T HAPPY with their reputation as technological copycats. To do something about it, they have begun a 10-year, big-budget research and development program to create new computers radically different from any existing today.

The Japanese call these envisioned machines the "fifth generation of computers," and they're already planning an international conference on the subject in Tokyo Oct. 19-22. Despite some initial grumbling that the Japanese were again trying to pick Western brains, most major American and European computer companies are expected to send representatives.



The previous four generations of computers, by the Japanese count, were categorized according to their elements: the first used the vacuum tube, the second the transistor, the third the integrated circuit, or semiconductor, and the fourth the very large scale integrated circuit, or VLSI.

The Japanese expect the fifth generation to use, in addition to VLSIs, circuits that work on different physical principles from today's semiconductors. These powerful new circuits, however, are far from the only way in which fifth generation computers will be revolutionary.

A U.S. COMPUTER EXPERT SAYS that what the Japanese plan for the fifth generation is "at the cutting edge of computer research in all aspects": new hardware, new software, new architecture and a new way of communicating with human beings. In other words, he says, the Japanese aim is no less than to solve most of the major problems that computer scientists everywhere have been working on for years, and then incorporate the solutions into one machine.

Others have dreamed of such a machine, but no one has announced such an ambitious plan to make it a reality. "It's way beyond what anybody else is talking about," says an International Business Machines Corp. spokesman in Tokyo.

Understandably, there's bound to be plenty of skepticism among Western computer experts that the Japanese can pull it off. For the first time, they will be charting major new technological territory of their own rather than simply perfecting existing technology. "This is a completely new experience for us," concedes Sozaburo Okamatsu, director of the electronics policy division of Japan's Ministry of International Trade and Industry.

THE JAPANESE MACHINE would be able to hear and talk—at first in a special language and ultimately in natural human language. Unlike today's computers, which store and process "data," the fifth generation computer will have "knowledge" with which to solve problems. Say the word "elephant" to it and it will conjure up an image of a large, gray animal living in Africa or India, just as would the human brain. Tell it you'd like your payroll processed, and it will first write its own computer program to perform the task, and then do it.

To build a computer that could talk to humans and seem to think like them, the Japanese will have to devise extremely sophisticated programs or software. Then they will have to build memory and processing capacity, or hardware, that can support the software. Among the possibilities they're exploring is the use of "data-flow" hardware capable of doing more than one operation at a time.

The machine probably will have "Josephson's Junctions," circuits that will operate at absolute zero temperature and will be much more rapid than the fastest semiconductors. Japanese scientists are developing these "JJs" as part of separate but related work on a "supercomputer." Mr. Okamatsu of the trade ministry says the supercomputer will function much like today's computers, only 1,000 times faster.

BUT THE EMPHASIS of the fifth generation computer, say Hideo Aiso, who is in charge of hardware research, is o "logical power, not physical power," that is, on thinking in human-like fashion rather than on speed of processing o volume of data.

The international trade ministry has made development of th computer by the early 1990s a national goal. It plans to pump $ million into it in the first three years and probably a lot more late Some say it could take as much as $450 million over 10 years; M. Aiso puts the figure at more than $1 billion. The ministry also knocking heads to get Japan's highly competitive computer make to work together and with academic scientists on the project.

To read the Japanese press, the fifth generation computer almost an accomplished fact. The only issue is whether Japan wi *allow* foreign computer makers to participate in the research. Asa Shimbun, a leading Japanese daily, recently reported that the inte national trade ministry had decided to have Japan "take the lead" i the research, excluding most foreign participation.

Whether or not they're invited to play a role, Western com puter makers will be watching the Japanese closely. They'v learned, notes the IBM man in Tokyo, that when it comes to accom plishing what they set out to do, "the Japanese have a track record."